

In the claims:

Cancel claims 1, 3-6, 10, 11, 13-15, and 19-33 and amend the remaining claims where indicated.

1. (Cancelled)

2. (Currently Amended) ~~A magnetic head assembly as claimed in claim 1 wherein~~
the LBS includes: A magnetic head assembly having an air bearing surface (ABS) comprising:
a read head including:
first and second ferromagnetic shield layers;
a read sensor recessed from the ABS and which includes a ferromagnetic free layer;
a ferromagnetic flux guide magnetically connected to the read sensor and extending
from the read sensor to the ABS for conducting field signals to the read sensor;
each of the read sensor and the flux guide being located between ferromagnetic first
and second shield layers;
a distance between the first and second shield layers at the ABS being less than a
distance between the first and second shield layers at the read sensor; and
a longitudinal biasing stack (LBS) magnetically coupled to the free layer for biasing
a magnetic moment of the free layer parallel to the ABS and parallel to major planes of the
layers;
the LBS including:
a hard bias layer; and
a nonmagnetic metal spacer layer located between and interfacing the free layer and
the hard bias layer.

3-6 (Cancelled)

7. (Currently Amended) A magnetic head assembly as claimed in claim [[1]] 2 further
comprising:
the flux guide including an extension of the free layer which extends from the sensor to the
ABS;

the read sensor further including:

a ferromagnetic pinned layer that has a magnetic moment;

an antiferromagnetic pinning layer exchange coupled to the pinned layer for pinning the magnetic moment of the pinned layer; and

a spacer layer located between the pinned layer and said free layer; and said pinned layer, pinning layer and spacer layer being located only in said read sensor.

8. (Original) A magnetic head assembly as claimed in claim 7 further comprising: a write head including:

ferromagnetic first and second pole piece layers that have a yoke portion located between a pole tip portion and a back gap portion;

a nonmagnetic write gap layer located between the pole tip portions of the first and second pole piece layers;

an insulation stack with at least one coil layer embedded therein located between the yoke portions of the first and second pole piece layers; and

the first and second pole piece layers being connected at their back gap portions.

9. (Original) A magnetic head assembly as claimed in claim 8 including:

the second shield layer being located between the first shield layer and the second pole piece layer; and

the free layer being located between the pinned layer and the second shield layer.

10-11 (Cancelled)

12. (Currently Amended) ~~A magnetic disk drive as claimed in claim 11 wherein the LBS includes:~~ A magnetic disk drive including:

a read head including:

first and second ferromagnetic shield layers;

a read sensor recessed from the ABS and which includes a ferromagnetic free layer;

a ferromagnetic flux guide magnetically connected to the read sensor and extending from the read sensor to the ABS for conducting field signals to the read sensor;

each of the read sensor and the flux guide being located between ferromagnetic first and second shield layers;

10 a distance between the first and second shield layers at the ABS being less than a
11 distance between the first and second shield layers at the read sensor; and
12 a longitudinal biasing stack (LBS) magnetically coupled to the free layer for biasing
13 a magnetic moment of the free layer parallel to the ABS and parallel to major planes of the
14 layers;
15 the LBS including:
16 a hard bias layer; and
17 a nonmagnetic metal spacer layer located between and interfacing the free layer and
18 the hard bias layer[.];
19 a write head including:
20 ferromagnetic first and second pole piece layers that have a yoke portion located
21 between a pole tip portion and a back gap portion;
22 a nonmagnetic write gap layer located between the pole tip portions of the first and
23 second pole piece layers;
24 an insulation stack with at least one coil layer embedded therein located between the
25 yoke portions of the first and second pole piece layers; and
26 the first and second pole piece layers being connected at their back gap portions;
27 a housing;
28 a magnetic disk rotatably supported in the housing;
29 a support mounted in the housing for supporting the magnetic head assembly with said ABS
30 facing the magnetic disk so that the magnetic head assembly is in a transducing relationship with the
31 magnetic disk;
32 a spindle motor for rotating the magnetic disk;
33 an actuator positioning means connected to the support for moving the magnetic head
34 assembly to multiple positions with respect to said magnetic disk; and
35 a processor connected to the magnetic head assembly, to the spindle motor and to the actuator
36 for exchanging signals with the magnetic head assembly, for controlling movement of the magnetic
37 disk and for controlling the position of the magnetic head assembly.

1 13-15 (Cancelled)

1 16. (Currently Amended) A magnetic disk drive as claimed in claim [[11]] 12 wherein

2 the spacer layer is a nonmagnetic electrically nonconductive barrier layer.

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17. (Currently Amended) A magnetic disk drive as claimed in claim [[11]] 16 further comprising:

the flux guide including an extension of the free layer which extends from the sensor to the ABS;

the read sensor further including:

a ferromagnetic pinned layer that has a magnetic moment;

an antiferromagnetic pinning layer exchange coupled to the pinned layer for pinning the magnetic moment of the pinned layer; and

a spacer layer located between the pinned layer and said free layer; and

said pinned layer, pinning layer and spacer layer being located only in said read sensor.

1 18. (Original) A magnetic disk drive as claimed in claim 17 including:

2 the second shield layer being located between the first shield layer and the second pole piece
3 layer; and

4 the free layer being located between the pinned layer and the second shield layer.

1 19-33 (Cancelled)

Add new claims 34-39.

1 34. (New) A magnetic head assembly as claimed in claim 2 further comprising:

2 each of the free layer, hard bias layer and spacer layer having top and bottom large surfaces
3 which are bounded by front and rear surfaces and first and second side surfaces wherein the front
4 surfaces form a portion of the ABS and each of the top and bottom large surfaces has a larger surface
5 area than each of the front and rear surfaces and each of the first and second side surfaces and is
6 perpendicular thereto; and

7 each of the top and bottom large surfaces of the spacer layer interfacing a respective large
8 surface area of the free layer and the hard bias layer.

1 35. (New) A magnetic head assembly as claimed in claim 2 further comprising:

the read sensor having a sensor stripe height and the flux guide having a flux guide stripe height; and
dielectric layers electrically insulating some of the layers of the read head along the flux guide stripe height except along the sensor stripe height.

36. (New) A magnetic head assembly as claimed in claim 35 further comprising:
each of the free layer, hard bias layer and spacer layer having top and bottom large surfaces which are bounded by front and rear surfaces and first and second side surfaces wherein the front surfaces form a portion of the ABS and each of the top and bottom large surfaces has a larger surface area than each of the front and rear surfaces and each of the first and second side surfaces and is perpendicular thereto; and
each of the top and bottom large surfaces of the spacer layer interfacing a respective large surface area of the free layer and the hard bias layer.

37. (New) A magnetic disk drive as claimed in claim 12 further comprising:
each of the free layer, hard bias layer and spacer layer having top and bottom large surfaces which are bounded by front and rear surfaces and first and second side surfaces wherein the front surfaces form a portion of the ABS and each of the top and bottom large surfaces has a larger surface area than each of the front and rear surfaces and each of the first and second side surfaces and is perpendicular thereto; and
each of the top and bottom large surfaces of the spacer layer interfacing a respective large surface area of the free layer and the hard bias layer.

38. (New) A magnetic disk drive as claimed in claim 12 further comprising:
the read sensor having a sensor stripe height and the flux guide having a flux guide stripe height; and
dielectric layers electrically insulating some of the layers of the read head along the flux guide stripe height except along the sensor stripe height.

39. (New) A magnetic head assembly as claimed in claim 38 further comprising:
each of the free layer, hard bias layer and spacer layer having top and bottom large surfaces which are bounded by front and rear surfaces and first and second side surfaces wherein the front surfaces form a portion of the ABS and each of the top and bottom large surfaces has a larger surface area than each of the front and rear surfaces and each of the first and second side surfaces and is

- 6 perpendicular thereto; and
 - 7 each of the top and bottom large surfaces of the spacer layer interfacing a respective large
 - 8 surface area of the free layer and the hard bias layer.
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